Effects on Motor Vehicle Crashes of the Livestock Control Project on the Fort Apache Indian Reservation. Hayden S. Anderson, Class of 1994.

ABSTRACT

In the mid–1970's, the Tribal Council of the White Mountain Apache Tribe determined that freely roaming livestock on reservation roadways posed a health and safety hazard. In 1991, after a number of regulatory efforts failed, the Tribal Council passed a resolution that established a Livestock Control Project to control freely roaming livestock on reservation roads. This study was conducted to determine if this Livestock Control Project reduced the risk of automobile crashes and the number of livestock-related crashes on the reservation.

Motor vehicle crash records for the reservation were reviewed for a six-year period (1987-1994). Livestock-related crashes before and after the establishment of the project were compared. Crash rates were calculated from traffic volume figures provided by the Arizona Department of Transportation. The number of livestock collected and their disposition were identified.

The rate of livestock-related crashes in the study area was reduced by 3.5 times since the establishment of the Livestock Control Project, with the livestock-related crash rate on the reservation of 0.32 per 100,000 vehicles before the project and 0.09 per 100,000 vehicles since establishment of the project. The Livestock Control Project has collected livestock consistently since its establishment.

The Livestock Control Project has been successful in making a dramatic reduction in the number of livestock-related motor vehicle crashes on the reservation. The project is an example of a successful community-based effort that can be replicated in other communities.

Introduction

In the mid-1970's, the Tribal Council of the White Mountain Apache Tribe (WMAT) and Whiteriver Indian Health Service (IHS) determined that freely roaming livestock on the reservation roadways and residential areas posed a health and safety hazard. A number of unintentional injuries and motor vehicle fatalities had been observed during the early 1970's. The WMAT enacted an ordinance on March 4, 1976, to control livestock on roadways and thus reduce the hazards of unintentional injuries and motor vehicle fatalities.

This ordinance authorized the General Livestock Coordinator to impound all livestock in trespass. No livestock were permitted to roam or graze within any highway, public community roadway, residential area, school, government compound or any other area where livestock might threaten the public health, safety or welfare. When livestock were found in violation of the ordinance, they were impounded in a corral; the owners of livestock were to be given a notice of impoundment and had 20 days to redeem the impounded livestock.

Although well-intended, the implementation and enforcement of this ordinance was inconsistent and ineffective. During subsequent years, the Tribal Council enacted nine tribal resolutions directed at removing this highway hazard. Unfortunately, these resolutions as well, as the original ordinance, were for various reasons all unsuccessful.

In 1986, a study (Hickey, Akin and Rothfus, 1986) was conducted that again documented that almost one- third (32%) of all motor vehicle crashes were animal-related and that the majority of these crashes (80%) involved horses. In June, 1991, the Tribal Health Education Department (THED) interviewed past and present council members (and the past Livestock Coordinator) to determine why the original ordinance was not effective in controlling livestock. These interviews suggested that the primary deficiency in the ordinance was a clause that allowed tribal members to receive an exemption from the enforcement provisions of the ordinance.

In July, 1991, the THED conducted a public-opinion survey and sought support for an enforceable livestock control project. This survey found 93% of the community believed that livestock on roadways were a safety hazard and that 94% supported full enforcement of the ordinance. The findings in the survey were published in both the community newspaper (Apache Scout) and a statewide newspaper

(Arizona Republic). On August 8, 1991, a one-day special session of the Tribal Council was convened to discuss the issue. At that meeting, the Tribal Council passed a resolution directing the Whiteriver Police Department to implement an enforceable livestock control project, similar to the original 1976 ordinance. The project was implemented three weeks later and has been in operation since. The purpose of this study is determine if this Livestock Control Project reduced the risk of automobile crashes and the number of livestock-related crashes on the reservation.

Methods

This study reviewed all reported motor vehicle crashes occurring on the reservation roadways and within the boundaries of the Fort Apache Indian Reservation over a six-year period from January 1, 1989, through December 31, 1994. The motor-vehicle crash cases were taken from the logs of the Whiteriver Police Department. Police department staff provided copies of the crash cases, the number of livestock impounded by the project and the project's disposition of the livestock. This study compared the number of motor vehicle-livestock crashes occurring before and after the implementation of the livestock control project.

To determine the expected number of crashes during the periods before and after the intervention, the total number of vehicles passing six roadway mileposts was ascertained from the Arizona Department of Transportation. These vehicle counts were used as an estimate of the number of vehicle miles driven on reservation roads for the two time periods. Ratios of crashes to vehicles were calculated and tested using a Chi-square statistic.

Results

Over the entire six-year period of the study, 1,926 crashes occurred on the Fort Apache Indian Reservation. Of these, 160 (8.3%) were due to livestock. The yearly number of total crashes and livestock-related crashes, and the total number of vehicles observed at six mileposts on the reservation, are shown in Table 1. The periods prior to the intervention and after the intervention are shown separately. The fraction of crashes due to livestock after the intervention was one-third of that for the period before the intervention ($p<.001$).

The ratios of crashes per 100,000 vehicles passing the mileposts for the period prior to the intervention and after the intervention are given in Table 2. Before the intervention, there were 2.44 crashes per 100,000 vehicles passing the mileposts. After the intervention, there were 2.25 crashes per 100,000 vehicles. The difference in non-livestock crashes is small and on the margin of statistical significance ($p<.052$). For livestock-related crashes, the differences are more dramatic. Prior to the intervention, there were 0.32 crashes per 100,000 vehicles, whereas after there were 0.09. This was a 72% reduction in the occurrence of livestock-related crashes on the reservation ($p<.001$).

Had the ratio of crashes occurrence per vehicle passing the milepost after the intervention remained at the level prior to the intervention, there would have been 950 crashes rather than 798 observed. If the ratio of livestock-related crashes to total vehicles-passing-milepost remained the same, there would have been 109 crashes, rather than 31 observed. Therefore, the drop in livestock-related crashes accounted for a reduction of 78 crashes or 51% of the entire reduction in vehicle crashes for the latter time period.

The livestock control project's records were reviewed to describe the project's level of activity and disposition of impounded livestock (Table 3). During the first full year of operations (1992), a large number of livestock were impounded, sold or returned to the owner with or without a fee. During 1993, the number of impounded livestock declined.

Discussion

The Livestock Control Project resulted in a dramatic reduction in the number of livestock collisions on roadways on the reservation. There has been a 72% decline in the rate of motor-vehicle/livestock collisions since the implementation of the project. The risk of having a collision with stray livestock was an ever-present danger for motorists on the reservation for years prior to the successful implementation of this project. The crash reduction was possible because of the certainty of livestock removal from the reservation roadways. Prior efforts to control this problem were not successful because livestock owners knew there was little risk of their stray livestock being impounded; and, if they were impounded, there was

a good possibility they could have the livestock returned without fine. Livestock have been consistently collected throughout the existence of the project, and 80% of the impoundments have resulted in the livestock being sold or returned after a fee was paid.

Since the project's establishment, the public perception of livestock on the roadway has changed. According to the 1991 public survey, 81% of community members polled said they had either hit or nearly hit livestock in the past year. There was little expectation that anything would be done about stray livestock
on the roadway. Survey responses in 1991 included:

> "Do something about the stray livestock. Not just talk about it!"
> "Let's quit dragging our feet and get the job done permanently."
> "Why have an ordinance when it is not being enforced? I sincerely hope something will come out of this questionnaire!"

Now, livestock owners know that their animal will be impounded if they let it stray onto the roadway. Community members regularly report stray livestock on the roadway to the police department, and they know they will be removed. Although not measured in this study, it is reasonable to expect that driving is less stressful since the threat of collisions with livestock has diminished. In fact, conversations with motorists reveal a perception of increased safety and less stress when driving on reservation roadways.

The success of this project was the result of community concern for the risk that livestock on the roadway posed to community members. The process that led to the Tribal Council's establishing the Livestock Control Project was very effective and may be useful for others trying to convince governments to address a community concern. The key components of this process are:

* Leadership - A committed community member took on the issue as a cause that needed to be solved. Research into the issue was done by the Tribal Health Education Department and suggestions, recommendations, and alternative approaches were prepared on how to address the problem.

* Political Support - Support for the cause was initially gained from a Tribal Council member. One Tribal Council member (The late Virgil Hinton, Council Member of District IV) was very vocal and sincere about implementing an intervention project. Health Education supplied related information to him. Later, he convinced his colleagues about the magnitude of the livestock problem.

* Public Support - Following endorsement of the project by the Tribal Natural Resources Committee, a community survey was conducted that confirmed overwhelming public concern for the issue and support for a final solution to the problem.

* Media Coverage – The livestock issue was publicized in two newspapers and the community radio station. A local community and a statewide newspaper, the Apache Scout and the Arizona Republic, reported on the livestock problem and the findings of the community survey.

Conclusion

This evaluation demonstrated that the Livestock Control Project was successful in reducing the risk of automobile crashes and the number of livestock-related crashes on the reservation. The project's success is recognized by community members and is confirmed by the 72% reduction in occurrence of livestock-related crashes on the reservation. This project's effective intervention strategy can serve as a model for other tribal community groups or Indian Health Service staff throughout the Indian Country. The strategy offers important insights on how to approach a tribal government when seeking legislation.

References

1. Hickey WV, Akin DR, Rothus GL: A Study of Roadway and Roadside Hazards on the Fort Apache Indian Reservation, September 1986.

2. Anderson HS: Livestock in Trespass...Highway Safety? Unpublished, 1991.

Table 1 - Year of Crashes and Vehicles Observed

Prior to Intervention

Year	Total Crashes	Livestock Crashes	%Crashes Livestock Related	Vehicles Observed
1987	338	24	7.1%	8,792,850
1988	254	31	12.2%	9,964,500
1989	254	36	14.2%	10,037,500
1990	194	29	14.9%	8,953,450
1991	88	9	10.2%	3,157,739
Total	1,128	129	11.4%	40,906,039

After Intervention

1991	54	2	3.7%	5,702,891
1992	215	7	3.3%	9,588,550
1993	257	12	4.7%	9,588,550
1994	272	10	3.7%	9,588,550
Total	798	31	3.9%	34,468,541

Table 2 - Crash ratios before and after intervention

	Before	After	
Vehicles	40,906,039	34,468,541	
Non-livestock Crashes	1,128	798	
Livestock Crashes	129	31	
Non-livestock Crash ratio/100,000 vehicles	2.575	2.315	(p<.0002)
Livestock crash ratio/100,000	0.314	0.090	(p<.000001)

Table 3 - Enforcement Data

Year	Number of Livestock Impounded	Number Sold	Number Returned To Owner/No Fee	Number Paid Fee
1991*	218	20	11	187
1992	330	58	54	207
1993	210	44	75	87
1994**	105	6	30	67
Total	863	128	170	549

* The actual impoundment activity started on August 26, 1991

** In 1994, there were six months of no impoundment activity due to no vehicle, but personnel directed all livestock in trespass to safer location and away from being a hazard.